A. Cover Sheet *(Attach to front of proposal.)*

1. Specify: X agricultural project or urban project; individual application or joint application

2. Proposal title -concise: Vandalia Irrigation District Conjunctive Use Reservoir Project

3. Principal applicant—organization or affiliation: Vandalia Irrigation District

4. Contact—name, title: Steve Drumright, General Manager

5. Mailing address: 2032 S. Hillcrest, Porterville, CA 93257

6. Telephone: (559)784-0121

7. Fax: (559)784-0414

8. E-mail: sbdrum@onemain.com

9. Funds requested—dollar amount: $260,000.00

10. Applicant cost share funds pledged—dollar amount: $77,000.00

11. Duration—(month/year to month/year): 6-2001 to 3-2002

12. State Assembly and Senate districts and Congressional district(s) where the project is to be conducted: Roy Ashburn, 32nd District, Chuck Poochigian, 14th District, Bill Thomas, 21st District

13. Location and geographic boundaries of the project: 70 acre parcel north of Ave 140 and south of Hwy 190 – 1 mile east of Plano Road

14. Name and signature of official representing applicant. By signing below, the applicant declares the following:

- the truthfulness of all representations in the proposal;
- the individual signing the form is authorized to submit the application on behalf of the applicant;
- the applicant will comply with contract terms and conditions identified in Section 11 of this PSP.

_____ _____

Printed name of applicant Date

_____

Signature of Applicant

Vandalia Irrigation District
2032 South Hillcrest
Porterville, CA 93257

February 12, 2001

Water Use Efficiency Office
California Dept.. of Water Resources
1020 Ninth St. Third Floor
Sacramento, CA. 95814

Attention: Proposal Review Members

Re: Vandalia Irrigation District Reservoir Project Surface and Groundwater Utilization

Dear Reviewing Committee;

We are applying for the grant funding with regards to the Water Use Efficiency Program.

I would like to give you a brief history and characteristics of the district. Also our plans and goals for the future.

We are situated southeast of Porterville in the central San Joaquin Valley. The district was formed in 1923 and is a public agency. We are not a C.V.P. contractor. Our sole source of water is the Tule River watershed. We are entitled to a percentage of the contracted storage space behind Success Reservoir.

On the 21st of June 2000, the Irrigation Training and Research Center (ITRC) of California Polytechnic State University came to our facility for a site visit and to perform a rapid appraisal on the Vandalia Irrigation District. The purpose of the visit was to investigate the possibility of changing the operations of the district from a groundwater-only district to a conjunctive-use district. Currently, all of the water for the district operations is percolated into a series of reservoirs located within an old alignment of the Tule River. The water is diverted from the Tule River and travels about 5 miles (1/2 mile lined) through the Campbell-Moreland (CM) Ditch to the start of the district located northeast of the intersection of Avenue 140 and Road 260. Water is diverted into 2 percolation pond areas for 2 well fields, lifted and pipelined to Booster Station #1 using 17 deep well pumps, and then boosted within the district using 3 separate booster pump stations.

Scope of Work
Recommendations

Suggested changes to the district would be to add a reservoir at the start of the district near Booster Pump #1. This could be used to store surface water directly from the CM Ditch. A new booster pump station would need to be added to handle the different pumping requirements to lift from the reservoir.

1) New reservoir located near existing Booster Pump Station 1.
2) New booster pumps at booster station #1(4,000 gpm).
3) New filtration system at booster station #1(4,000 gpm).
4)VFD on one of the new booster pumps.

5) SCADA package for monitoring pressures in the system.

The advantages to the district of a modified operation include:

- Decreased energy costs/use - with the future uncertainty in the deregulated marketplace this might have a significant impact on future operations.

- Additional capacity for groundwater recharge - this would allow the district more flexibility to store water with the percolation pond areas for use in drought years. This has the added benefit of aiding USBR contractors located downslope of Vandalia ID. This is possible because Vandalia ID does not use its full entitlement of the surface water supply from Success Lake. It is estimated by Steve that this could be close to 2,000 acre-feet in a wet year.

- Increased capacity at peak flow requirement periods - it is anticipated the project will require the addition of a new booster pump station located parallel to Booster Station #1. This will allow for additional capacity to be put into the pipelines. The pipeline system has a capacity of 4,000 gpm. This is limiting during the peak water use period. There is additional capacity at Booster Pump Station #2. The additional capacity can do 2 things: i) provide additional capacity at peak requirements, and ii) provide capacity to add additional acreage to the district tax base.

- Improved ability to handle fluctuations in the CM Ditch. Instead of the inefficiency of varying flows being turned into the percolation ponds and then being re-lifted to the pipelines.

- Centralized filtration to improve filtering. Right now the water is partially filtered by the well system. However, wells will place a heavy load of sand into the system. Sand is very difficult to remove from the system.

- Increased flexibility. Changing the district's ability to improve the frequency, rate, and duration of the flows will improve the availability and reliability of the water supplies. These items will in turn provide the farmers with better service and with better service yield improvements are possible.

The disadvantages include:

- Expense of a reservoir, booster pump upgrade (or replacement), variable frequency drive (VFD), and filters.

- A surface water supply from a reservoir will require more filtration than is being done currently.

Cost Estimate Spreadsheets

Currently, Vandalia ID spends about $100,000 per year (1,000,000 KwH) on electricity for the pumping of water for about 1,300 acres of citrus trees.

The attached spreadsheets are set up to show what the annual savings could be if Vandalia ID decided to modify operations with a reservoir to deliver water. The annual

cost per year and annual Kilowatt per hour columns are shown for each well and booster pump station for present and possible future conditions.

The first set of data is from Vandalia ID records and information collected by Southern California Edison. The data include the calculated hour per year operation of each well and booster pump, dollars spent per year, and Kilowatt-hours. Shown at the top of each table is a ratio of peak use time during an average week between On-Peak, Mid-Peak, and Off-Peak times. These numbers are used to reflect approximate operating conditions and were used mainly to recreate a calculation of the total cost of operating well and booster pumps. Also included in the electricity costs were the "Facilities related demand charges" and the "Time related demand charge."

The second set of data is related to the following assumptions:

- Wells would operate close to a free-flow operation discharge head.
- Wells would only operate 50% of the time (compared to current hours).
- Wells would only operate off-peak.
- Booster pump operation would be similar except, Booster Pump #1 will have a negative suction pressure (or close to zero psi) instead of 10 psi of positive inlet pressure.

On the sheet that displays well pump data, the On-Peak and the Mid-Peak charges were left zeroed out with the intent that the motors will not be in operation at those times. A portion amount of time is still allowed in the Off-Peak category since some wells may be needed at some point for back-up during the high demand times of year. The booster pump spreadsheets show the same information as the normal conditions pumping operation with the exception of the two 50 hp pumps at location #1. The TDH was increased due to the extra feet of head that must be boosted out of the reservoir.

Results

Refer to the attached spreadsheets. A saving of nearly $25,000 annually may be realized by modifying the operation of the district. There will be about $10,000 more spent on booster pump operation than before, but the well cost may decrease nearly $29,000 a year.

Estimated Costs

New booster pump station	$40,000	(2-40 hp pumps and manifold)
New filter system	$30,000	(20 sand media tanks)
Reservoir	$100,000	(Construction only - 40 af storage on 10 acres)
VFD	$30,000	(on one of the pump)
SCADA package	$60,000	(monitoring capability only)
Total	$260,000	

The simple payback would be about **10 years**. However, there is the added economic benefit of several other factors.

1) Pipeline capacity.
2) Increased flexibility.
3) Additional groundwater recharge.
4) Possibly, less sand in the system plugging and/or wearing out sprinklers.

Existing Operation Spreadsheets

Vandalia Irrigation District

1999 Well Usage in 24 Hour Days / Month

	1 A	2 B	3 C	4 #1	5 #5	6 #6	7 #7	8 #9	9 #12	10 #13	11 #18	12 #19	13 #20	14 #21	15 #22	16 #23	17 #24	Total Days	Total Hours
March	0	0	0	3	0	6	2	0	0	3	0	0	0	0	0	0	0	10	422
April	0	0	0	6	0	8	4	1	0	6	4	6	2	0	0	0	0	35	840
May	0	0	0	25	20	23	9	8	1	10	17	19	9	0	0	0	9	131	3626
June	0	5	0	23	30	28	14	19	10	14	29	21	25	7	4	3	13	245	5880
July	5	18	4	22	31	31	20	19	14	24	30	30	30	21	6	9	21	327	7848
August	2	14	1	20	30	29	16	24	20	26	31	31	30	21	6	7	16	324	7776
September	1	9	2	22	30	30	22	21	16	24	29	30	29	18	6	8	28	317	7608
October	2	6	2	20	28	28	11	17	11	15	28	30	28	13	5	1	9	254	6096
November	1	4	0	3	16	14	2	6	7	12	14	14	13	6	2	0	2	116	2784
December	2	4	1	0	14	15	0	6	8	10	11	13	12	7	2	2	8	115	2760
Total Days	13	52	10	147	199	212	100	121	87	144	193	194	178	93	31	30	98	1902	45648
Total Hours	312	1248	240	3528	4776	5088	2400	2904	2088	3456	4632	4656	4272	2232	744	720	2352	45648	

1999 Booster Pump Usage in 24 Hour Days / Year

Station #1	**Days**
25 HP Booster	202
25 HP Booster	97
Station #2	
75 HP Booster	123
40 HP Booster	152
15 HP Booster	61
7.5 HP Booster	65
Station #3	
50 HP Booster	95
25 HP Booster	145
7.5 HP Booster	30
Total:	970 Days
	23280 Hours / Year

Modified Operation Spreadsheets
Reservoir
New Booster Pump Station
New Filter Pump Station

	Well A	Well B	Well #5	Well #12	Well # 13	Well #18	Well # 19	Well #20	Well #21		
Test Results	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	AVERAGE	TOTAL
Discharge Pressure, PSI	23.6	24.0	22.3	18.5	16.2	24.0	25.7	24.3	26.6	22.8	
Standing Water Level, Ft.	31.7	27.5	15.4	12.6	12.0	17.9	16.1	12.5	15.6	17.9	
Drawdown, Ft.	119.3	72.5	20.6	41.0	5.7	5.9	4.3	46.6	17.0	37.0	
Discharge Head, Ft.	54.5	55.4	51.5	42.7	37.4	55.4	59.4	56.1	61.4	52.6	
Pumping Water Level, Ft.	151.0	100.0	36.0	53.6	17.7	23.8	20.4	59.1	32.6	54.9	
Total Head, Ft.	205.5	155.4	87.5	96.3	55.1	79.2	79.8	115.2	94.0	107.6	
Capacity, GPM	99.0	235.0	203.0	173.0	324.0	202.0	427.0	202.0	196.0		2061.0
GPM per Ft. Drawdown	0.8	3.2	9.9	4.2	56.8	34.2	99.3	4.3	11.5	24.9	
Acre Ft. Pumped in 24 Hrs.	0.438	1.039	0.897	0.765	1.432	0.893	1.877	0.893	0.866		9.1
kW Input to motor	13.8	15.2	7.9	7.3	9.3	6.9	10.1	7.1	7.4	9.4	85.0
HP Input to Motor	18.5	20.4	10.6	9.8	12.5	9.3	13.5	9.5	9.9	12.7	114.0
Motor Load (%)	106.1	81.5	82.6	83.2	106.0	97.5	77.7	80.9	104.5		
Measured Speed of Pump, RPM	1766	N/A	N/A	N/A	N/A	N/A	N/A	1776.0	205.0		
kWh per Acre Ft.	757.0	351.0	211.0	229.0	156.0	186.0	128.0	191.0	46.9	250.7	2255.9
Overall Plant Efficiency (%)	27.8	45.2	42.3	43.0	36.1	43.7	63.5	61.7	178.0	60.1	

Vandalia Irrigation District

NORMAL CONDITONS -
ALL WELLS

Hydraulic Test Results

Test Results	Well A	Well B	Well C	Well #1	Well #5	Well #6	Well #7	Well #9	Well #12	Well # 13	Well #18	Well # 19	Well #20	Well #21	Well #22	Well #23	Well #24		
	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	Test 1	AVERAGE	TOTAL
Motor Horsepower	15.0	20.0	20.0	15.0	10.0	10.0	15.0	15.0	10.0	10.0	7.5	15.0	10.0	7.5	15.0	50.0	15.0		210.0
Discharge Pressure, PSI	23.6	24.0	27.3	19.0	22.3	23.4	15.4	22.1	18.5	16.2	24.0	25.7	24.3	26.6	23.4	18.2	20.0	22.0	
Standing Water Level, Ft.	31.7	27.5	34.3	11.4	15.4	16.8	21.4	37.2	12.6	12.0	17.9	16.1	12.5	15.6	21.1	95.7	12.7	24.2	
Drawdown, Ft.	119.3	72.5	139.9	7.1	20.6	21.7	12.0	14.5	41.0	5.7	5.9	4.3	46.6	17.0	79.9	115.9	115.4	49.4	
Discharge Head, Ft.	54.5	55.4	63.1	43.9	51.5	54.1	35.6	51.1	42.7	37.4	55.4	59.4	56.1	61.4	54.1	42.0	46.2	50.8	
Pumping Water Level, Ft.	151.0	100.0	174.2	18.5	36.0	38.5	33.4	51.7	53.6	17.7	23.8	20.4	59.1	32.6	101.0	211.6	128.1	73.6	
Total Head, Ft.	205.5	155.4	237.3	62.4	87.5	92.6	69.0	102.8	96.3	55.1	79.2	79.8	115.2	94.0	155.1	253.6	174.3	124.4	
Capacity, GPM	99.0	235.0	196.0	323.0	203.0	193.0	267.0	315.0	173.0	324.0	202.0	427.0	202.0	196.0	128.0	487.0	225.0		4195.0
GPM per Ft. Drawdown	0.8	3.2	1.4	45.5	9.9	8.9	22.3	21.7	4.2	56.8	34.2	99.3	4.3	11.5	1.6	4.2	1.9	19.5	
Acre Ft. Pumped in 24 Hrs.	0.438	1.039	0.866	1.428	0.897	0.853	1.180	1.392	0.765	1.432	0.893	1.877	0.893	0.866	0.566	2.153	0.995		18.5
kW Input to motor	13.8	15.2	19.3	7.7	7.9	10.5	5.5	16.6	7.3	9.3	6.9	10.1	7.1	7.4	10.1	41.9	12.3	12.3	208.9
HP Input to Motor	18.5	20.4	25.9	10.3	10.6	14.1	7.4	22.3	9.8	12.5	9.3	13.5	9.5	9.9	13.5	56.2	16.5	16.5	280.2
Motor Load (%)	106.1	81.5	113.9	59.2	82.6	109.8	42.3	119.5	83.2	106.0	97.5	77.7	80.9	104.5	77.7	101.1	88.5		
Measured Speed of Pump, RPM	1766	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1776.0	205.0	N/A	N/A	N/A		
kWh per Acre Ft.	757.0	351.0	535.0	129.0	211.0	295.0	112.0	286.0	229.0	156.0	186.0	128.0	191.0	46.9	429.0	467.0	297.0	282.7	4805.9
Overall Plant Efficiency (%)	27.8	45.2	45.4	49.3	42.3	32.1	63.1	36.7	43.0	36.1	43.7	63.5	61.7	178.0	37.0	55.5	60.0	54.1	
kWh	4308	23712	4632	27876	38868	54936	12000	48600	15588	33252	32460	47748	30840	16872	7512	30168	28932		458304

Vandalia Irrigation District | Energy Use at Different Rates | Energy Cost Analysis

On Peak $0.11229 /kWh

Ratio of On-Peak Time During the Week: 0.30

	Existing Wells	GPM Q	TDH (ft)	AF/24(hrs)	Plant Eff.	Rate $/Kw-Hr	Hours per year	kWh/Ac.Ft	af	kW	$$/yr	kWh
1	Well A	99	205.5	0.438	0.278	$0.11229	274	757	5.0	13.8	424	3,772
2	Well B	235	155.4	1.039	0.452	$0.11229	554	351	24.0	15.2	946	8,438
3	Well C	196	237.3	0.866	0.454	$0.11229	252	535	9.1	19.3	546	4,863
4	Well #1	323	62.4	1.428	0.493	$0.11229	1,238	129	73.7	7.7	1,067	9,538
5	Well #5	203	87.5	0.897	0.423	$0.11229	1,613	211	60.3	7.9	1,428	12,758
6	Well #6	193	92.6	0.853	0.321	$0.11229	1,706	295	60.6	10.5	2,009	17,897
7	Well #7	267	69.0	1.180	0.631	$0.11229	900	112	44.3	5.5	557	4,950
8	Well #9	315	102.8	1.392	0.367	$0.11229	1,051	286	61.0	16.6	1,958	17,473
9	Well #12	173	96.3	0.765	0.430	$0.11229	806	229	25.7	7.3	661	5,886
10	Well #13	324	55.1	1.432	0.361	$0.11229	1,217	156	72.6	9.3	1,272	11,336
11	Well #18	202	79.2	0.893	0.437	$0.11229	1,570	186	58.4	6.9	1,220	10,825
12	Well #19	427	79.8	1.877	0.635	$0.11229	1,577	128	123.3	10.1	1,772	15,940
13	Well #20	202	115.2	0.893	0.617	$0.11229	1,462	191	54.4	7.1	1,166	10,385
14	Well #21	196	94.0	0.866	0.469	$0.11229	850	47	30.7	7.4	161	6,287
15	Well #22	128	155.1	0.566	0.370	$0.11229	403	429	9.5	10.1	458	4,076
16	Well #23	487	253.6	2.153	0.550	$0.11229	396	467	35.5	42.3	1,863	16,752
17	Well #24	225	174.3	0.995	0.600	$0.11229	886	297	36.7	12.3	1,224	10,905
	Totals										$18,734	172,080

Mid-Peak $0.078795 /kWh

Ratio of Mid-Peak Time During the Week: 0.20

Existing Wells	GPM Q	TDH (ft)	AF/24(hrs)	Plant Eff.	Rate $/Kw-Hr	Hours per year	kWh/Ac.Ft	af	kW	$$/yr	kWh
Well A	99	205.5	0.438	0.278	0.07256	182	757	3.3	13.8	183	2,515
Well B	235	155.4	1.039	0.452	0.07256	370	351	16.0	15.2	408	5,625
Well C	196	237.3	0.866	0.454	0.07256	168	535	6.1	19.3	235	3,242
Well #1	323	62.4	1.428	0.493	0.07256	826	129	49.1	7.7	460	6,358
Well #5	203	87.5	0.897	0.423	0.07256	1,075	211	40.2	7.9	615	8,505
Well #6	193	92.6	0.853	0.321	0.07256	1,138	295	40.4	10.5	865	11,932
Well #7	267	69.0	1.180	0.631	0.07256	600	112	29.5	5.5	240	3,300
Well #9	315	102.8	1.392	0.367	0.07256	701	286	40.6	16.6	844	11,649
Well #12	173	96.3	0.765	0.430	0.07256	538	229	17.1	7.3	285	3,924
Well #13	324	55.1	1.432	0.361	0.07256	811	156	48.4	9.3	548	7,557
Well #18	202	79.2	0.893	0.437	0.07256	1,046	186	38.9	6.9	525	7,217
Well #19	427	79.8	1.877	0.635	0.07256	1,051	128	82.2	10.1	764	10,626
Well #20	202	115.2	0.893	0.617	0.07256	974	191	36.3	7.1	502	6,923
Well #21	196	94.0	0.866	0.469	0.07256	566	47	20.4	7.4	70	4,192
Well #22	128	155.1	0.566	0.370	0.07256	269	429	6.3	10.1	197	2,717
Well #23	487	253.6	2.153	0.550	0.07256	264	467	23.7	42.3	803	11,168
Well #24	225	174.3	0.995	0.600	0.07256	590	297	24.5	12.3	527	7,270
Totals										$8,070	114,720

Off-Peak $0.03952 /kWh

Ratio of Off-Peak Time During the Week: 0.50

Existing Wells	GPM Q	TDH (ft)	AF/24(hrs)	Plant Eff.	Rate $/Kw-Hr	Hours per year	kWh/Ac.Ft	af	kW	$$/yr	kWh
Well A	99	205.5	0.438	0.278	0.03952	456	757	8.3	13.8	249	6,286 53
Well B	235	155.4	1.039	0.452	0.03952	924	351	40.0	15.2	555	14,064
Well C	196	237.3	0.866	0.454	0.03952	420	535	15.2	19.3	320	8,106
Well #1	323	62.4	1.428	0.493	0.03952	2,064	129	122.8	7.7	626	15,896
Well #5	203	87.5	0.897	0.423	0.03952	2,688	211	100.5	7.9	838	21,264
Well #6	193	92.6	0.853	0.321	0.03952	2,844	295	101.1	10.5	1,178	29,829
Well #7	267	69.0	1.180	0.631	0.03952	1,500	112	73.8	5.5	326	8,250
Well #9	315	102.8	1.392	0.367	0.03952	1,752	286	101.6	16.6	1,149	29,122
Well #12	173	96.3	0.765	0.430	0.03952	1,344	229	42.8	7.3	388	9,809
Well #13	324	55.1	1.432	0.361	0.03952	2,028	156	121.0	9.3	746	18,893
Well #18	202	79.2	0.893	0.437	0.03952	2,616	186	97.3	6.9	715	18,042
Well #19	427	79.8	1.877	0.635	0.03952	2,628	128	205.5	10.1	1,040	26,566
Well #20	202	115.2	0.893	0.617	0.03952	2,436	191	90.6	7.1	684	17,308
Well #21	196	94.0	0.866	0.469	0.03952	1,416	47	51.1	7.4	95	10,479
Well #22	128	155.1	0.566	0.370	0.03952	672	429	15.8	10.1	269	6,793
Well #23	487	253.6	2.153	0.550	0.03952	660	467	59.2	42.3	1,093	27,919
Well #24	225	174.3	0.995	0.600	0.03952	1,476	297	61.2	12.3	718	18,174
Totals										$10,989	286,799

Sample calculation: xx hrs/1 year* AF/24 hrs/24*Kw-hr/AF*$/KW-Hr

Total annual well pumping costs:	$37,793
Total annual well pumping kWh:	573,598

Vandalia Irrigation District | Energy Use at Different Rates | Energy Cost Analysis

On Peak 0.11229 / kWh

Ratio of On-Peak Time During the Week: 0.30

Booster Pump	Input HP	TDH (ft)	Flow (GPM)	% pump eff.	annual hours	Rate $/Kw-Hr	Kilowatts	$$/yr	kWh
#1-A	22.2	30.03	2050	0.70	1,454	0.11229	16.57	$2,706	24,096
#1-B	22.2	30.03	2050	0.70	698	0.11229	16.57	$1,299	11,571
#2-A	80.0	91.25	2430	0.70	886	0.11229	59.67	$5,934	52,847
#2-B	50.4	91.25	1530	0.70	1,094	0.11229	37.57	$4,617	41,119
#2-C	8.9	91.25	270	0.70	439	0.11229	6.63	$327	2,912
#2-D	3.0	91.25	90	0.70	468	0.11229	2.21	$116	1,034
#3-A	34.9	153.62	630	0.70	684	0.11229	26.05	$2,000	17,815
#3-B	24.9	153.62	450	0.70	1,044	0.11229	18.60	$2,181	19,423
#3-C	5.0	153.62	90	0.70	216	0.11229	3.72	$90	804
								$19,271	171,621

Mid-Peak $0.078795 / kWh

Ratio of Mid-Peak Time During the Week: 0.20

Booster Pump	Input HP	TDH (ft)	Flow (GPM)	% pump eff.	annual hours	Rate $/Kw-Hr	Kilowatts	$$/yr	kWh
#1-A	22.2	30.03	2050	0.70	970	$0.078795	16.57	$1,266	16,064
#1-B	22.2	30.03	2050	0.70	466	$0.078795	16.57	$608	7,714
#2-A	80.0	91.25	2430	0.70	590	$0.078795	59.67	$2,776	35,231
#2-B	50.4	91.25	1530	0.70	730	$0.078795	37.57	$2,160	27,413
#2-C	8.9	91.25	270	0.70	293	$0.078795	6.63	$153	1,941
#2-D	3.0	91.25	90	0.70	312	$0.078795	2.21	$54	690
#3-A	34.9	153.62	630	0.70	456	$0.078795	26.05	$936	11,877
#3-B	24.9	153.62	450	0.70	696	$0.078795	18.60	$1,020	12,948
#3-C	5.0	153.62	90	0.70	144	$0.078795	3.72	$42	536
								$9,015	114,414

Off-Peak $0.03952 / kWh

Ratio of Off-Peak Time During the Week: 0.50

Booster Pump	Input HP	TDH (ft)	Flow (GPM)	% pump eff.	annual hours	Rate $/Kw-Hr	Kilowatts	$$/yr	kWh
#1-A	22.2	30.03	2050	0.70	2,424	$0.03952	16.57	$1,587	40,159
#1-B	22.2	30.03	2050	0.70	1,164	$0.03952	16.57	$762	19,284
#2-A	80.0	91.25	2430	0.70	1,476	$0.03952	59.67	$3,481	88,079
#2-B	50.4	91.25	1530	0.70	1,824	$0.03952	37.57	$2,708	68,532
#2-C	8.9	91.25	270	0.70	732	$0.03952	6.63	$192	4,853
#2-D	3.0	91.25	90	0.70	780	$0.03952	2.21	$68	1,724
#3-A	34.9	153.62	630	0.70	1,140	$0.03952	26.05	$1,173	29,692
#3-B	24.9	153.62	450	0.70	1,740	$0.03952	18.60	$1,279	32,371
#3-C	5.0	153.62	90	0.70	360	$0.03952	3.72	$53	1,339
								$11,304	286,035

Booster Pump Totals: $39,591 572,069

Sample Calculation: xxx hrs / 1 year * $ / Kw-Hr *Kw

Total Annual Booster Pump Cost : $39,591

VID Total Connected Load	HP
Lower Well Field	110
Upper Well Field	100
Well #23	50
3-Booster Stations	270
Total	530

Facilities Related Demand Charge
$2.85 / kW
395 kW /month
12 months / year
$13,509.00 annually

Time Related Demand Charge
$9.00 / kW
395 kW / month
4 months per year, only used with On-Peak Charges
$4,266.00 annually

Total Well Pumping & Booster Pump Costs:

Well Pumps:	$37,793
Booster Pumps:	$39,591
Demand Charges:	$17,775

Total Cost, Booster Pumps & Well Pumps: **$95,159**

Total kWh, Booster Pumps & Well Pumps: **1,145,668**

Vandalia Irrigation District

FREEFLOW CONDITIONS -
SELECTED WELLS

Hydraulic Test Results

On Peak $0.11229 / kWh

Ratio of On-Peak Time During the Week: 0.30

Booster Pump	Input HP	psi u/s	psi d/s	TDH (ft)	Flow (GPM)	% pump eff.	annual hours	Rate $ / kWh	Kilowatts	$$/yr	kWh
#1-A	44.4	-1.0	25.0	60.06	2050	0.70	1,454	$0.11229	33.13	$5,411	48,191
#1-B	44.4	-1.0	25.0	60.06	2050	0.70	698	$0.11229	33.13	$2,599	23,141
#2-A	80.0	8.5	48.0	91.25	2430	0.70	886	$0.11229	59.67	$5,934	52,844
#2-B	50.4	8.5	48.0	91.25	1530	0.70	1,094	$0.11229	37.57	$4,617	41,117
#2-C	8.9	8.5	48.0	91.25	270	0.70	439	$0.11229	6.63	$327	2,912
#2-D	3.0	8.5	48.0	91.25	90	0.70	468	$0.11229	2.21	$116	1,034
#3-A	34.9	6.5	73.0	153.62	630	0.70	684	$0.11229	26.04	$2,000	17,815
#3-B	24.9	6.5	73.0	153.62	450	0.70	1,044	$0.11229	18.60	$2,181	19,422
#3-C	5.0	6.5	73.0	153.62	90	0.70	216	$0.11229	3.72	$90	804
										$23,276	207,280

Mid-Peak $0.078795 / kWh

Ratio of Mid-Peak Time During the Week: 0.20

Booster Pump	Input HP	psi u/s	psi d/s	TDH (ft)	Flow (GPM)	% pump eff.	annual hours	Rate $ / kWh	Kilowatts	$$/yr	kWh
#1-A	44.4	-1.0	25.0	60.06	2050	0.70	970	$0.078795	33.13	$2,531	32,128
#1-B	44.4	-1.0	25.0	60.06	2050	0.70	466	$0.078795	33.13	$1,216	15,428
#2-A	80.0	8.5	48.0	91.25	2430	0.70	590	$0.078795	59.67	$2,776	35,230
#2-B	50.4	8.5	48.0	91.25	1530	0.70	730	$0.078795	37.57	$2,160	27,411
#2-C	8.9	8.5	48.0	91.25	270	0.70	293	$0.078795	6.63	$153	1,941
#2-D	3.0	8.5	48.0	91.25	90	0.70	312	$0.078795	2.21	$54	690
#3-A	34.9	6.5	73.0	153.62	630	0.70	456	$0.078795	26.04	$936	11,876
#3-B	24.9	6.5	73.0	153.62	450	0.70	696	$0.078795	18.60	$1,020	12,948
#3-C	5.0	6.5	73.0	153.62	90	0.70	144	$0.078795	3.72	$42	536
										$10,888	138,187

Off-Peak $0.03952 / kWh

Ratio of Off-Peak Time During the Week: 0.50

Booster Pump	Input HP	psi u/s	psi d/s	TDH (ft)	GPM Q	% pump eff.	annual hours	Rate $ / kWh	Kilowatts	$$/yr	kWh
#1-A	44.4	-1.0	25.0	60.06	2050	0.70	2,424	$0.03952	33.13	$3,174	80,319
#1-B	44.4	-1.0	25.0	60.06	2050	0.70	1,164	$0.03952	33.13	$1,524	38,569
#2-A	80.0	8.5	48.0	91.25	2430	0.70	1,476	$0.03952	59.67	$3,481	88,074
#2-B	50.4	8.5	48.0	91.25	1530	0.70	1,824	$0.03952	37.57	$2,708	68,528
#2-C	8.9	8.5	48.0	91.25	270	0.70	732	$0.03952	6.63	$192	4,853
#2-D	3.0	8.5	48.0	91.25	90	0.70	780	$0.03952	2.21	$68	1,724
#3-A	34.9	6.5	73.0	153.62	630	0.70	1,140	$0.03952	26.04	$1,173	29,691
#3-B	24.9	6.5	73.0	153.62	450	0.70	1,740	$0.03952	18.60	$1,279	32,370
#3-C	5.0	6.5	73.0	153.62	90	0.70	360	$0.03952	3.72	$53	1,339
										$13,653	345,467
Booster Pump Totals:										$47,817	690,935

Sample Calculation: xxx hrs / 1 year * $ / KW-Hr *Kw

Annual Booster Pump Total: **$47,817**

VID Total Connected Load	HP
Lower Well Field	110
Upper Well Field	100
Well #23	50
3-Booster Stations	270
Total	530

Facilities Related Demand Charge
$2.85 / kW
395 kW /month
12 months / year
$13,509 annually

calc: ($2.85 / kW) * (393 kW / month) * (12 months / year)

Total kWh, booster pumps & wells: 911,138

Total Well Pumping & Booster Pump Costs:

Well Pumps:	$8,702
Booster Pumps:	$47,817
Demand Charges:	$13,509
Well & Booster Pump Total:	**$70,028**

Vandalia Irrigation District

FREEFLOW CONDITIONS -
SELECTED WELLS

Hydraulic Test Results

Test Results	Well A Test 2	Well B Test 2	Well #5 Test 2	Well #12 Test 2	Well # 13 Test 2	Well #18 Test 2	Well # 19 Test 2	Well #20 Test 2	Well #21 Test 2	AVERAGE	TOTAL
Discharge Pressure, PSI	3.0	2.1	7.2	1.5	2.0	7.7	7.7	9.3	6.8	5.3	
Standing Water Level, Ft.	31.7	27.5	15.4	12.6	12.0	17.9	16.1	12.5	15.6	17.9	
Drawdown, Ft.	122.7	76.1	31.7	41.5	6.4	8.3	7.2	52.4	45.0	43.5	
Discharge Head, Ft.	6.9	4.9	16.6	3.5	4.6	17.8	17.8	21.5	15.7	12.1	
Pumping Water Level, Ft.	154.4	103.6	47.1	54.1	18.4	26.2	23.3	64.9	60.6	61.4	
Total Head, Ft.	161.3	108.5	63.7	57.6	23.0	44.0	41.1	86.4	76.3	73.5	
Capacity, GPM	150.0	269.0	353.0	191.0	386.0	266.0	462.0	235.0	244.0		2556.0
GPM per Ft. Drawdown	1.2	3.5	11.1	4.6	60.3	32.0	89.2	4.5	5.4	23.5	
Acre Ft. Pumped in 24 Hrs.	0.633	1.189	1.560	0.844	1.706	1.176	2.838	1.039	1.078		12.1
kW Input to motor	13.4	14.2	8.8	7.0	8.9	7.4	10.1	7.7	7.6	9.5	85.1
HP Input to Motor	18.0	19.0	11.8	9.4	11.9	9.9	13.5	10.3	10.2	12.7	114.0
Motor Load (%)	103.0	76.2	92.0	79.8	101.4	104.5	77.7	87.8	107.4		
Measured Speed of Pump, RPM	1767	N/A	N/A	N/A	N/A	N/A	N/A	1777.0	169.0		
kWh per Acre Ft.	485.0	287.0	135.0	199.0	125.0	151.0	85.0	178.0	46.1	187.9	1691.1
Overall Plant Efficiency (%)	34.0	38.7	48.1	29.6	18.8	29.8	49.2	49.7	226.0	58.2	

On Peak: $0.11229 / kWh — Ratio of On-Peak Time During the Week: 0.00

	Existing Wells	TDH (ft)	GPM Q	AF/ 24hrs	% plant eff.	'99 Use (Hours)	Total Use AF	Rate $ / kWh	kWh/AF	kW	$$/yr	kWh
	Well A	161.3	150	0.633	0.340	0	0.00	$0.11229	485.0	13.4	$0	0
	Well B	108.5	269	1.189	0.387	0	0.00	$0.11229	287.0	14.2	$0	0
*	Well C	168.5	239	1.057	0.454	0	0.00	$0.11229	417.3	16.7	$0	0
*	Well #1	44.3	394	1.742	0.493	0	0.00	$0.11229	100.6	6.7	$0	0
	Well # 5	63.7	353	1.560	0.481	0	0.00	$0.11229	135.0	8.8	$0	0
*	Well #6	65.7	235	1.041	0.321	0	0.00	$0.11229	230.1	9.1	$0	0
*	Well #7	49.0	326	1.440	0.631	0	0.00	$0.11229	87.4	4.8	$0	0
*	Well #9	73.0	384	1.698	0.367	0	0.00	$0.11229	223.1	14.4	$0	0
	Well # 12	57.6	191	0.844	0.296	0	0.00	$0.11229	199.0	7.0	$0	0
	Well # 13	23.0	386	1.706	0.188	0	0.00	$0.11229	125.0	8.9	$0	0
	Well # 18	44.0	266	1.176	0.298	0	0.00	$0.11229	151.0	7.4	$0	0
	Well # 19	23.3	462	2.838	0.492	0	0.00	$0.11229	85.0	4.1	$0	0
	Well # 20	86.4	235	1.039	0.497	0	0.00	$0.11229	178.0	7.7	$0	0
	Well # 21	76.3	244	1.078	0.226	0	0.00	$0.11229	46.1	15.5	$0	0
*	Well #22	110.1	156	0.691	0.370	0	0.00	$0.11229	334.6	8.7	$0	0
*	Well #23	180.1	594	2.627	0.550	0	0.00	$0.11229	364.3	36.6	$0	0
*	Well #24	122.0	275	1.214	0.600	0	0.00	$0.11229	231.7	10.5	$0	0
											$0	0

Mid-Peak: $0.078795 / kWh — Ratio of Mid-Peak Time During the Week: 0.00

	Existing Wells	TDH (ft)	GPM Q	AF/ 24hrs	% plant eff.	'99 Use (Hours)	Total Use AF	Rate $ / kWh	kWh/AF	kW	$$/yr	kWh
	Well A	161.3	150	0.633	0.340	0	0.00	$0.078795	485.0	13.4	$0	0
	Well B	108.5	269	1.189	0.387	0	0.00	$0.078795	287.0	14.2	$0	0
*	Well C	168.5	239	1.057	0.454	0	0.00	$0.078795	417.3	16.7	$0	0
*	Well #1	44.3	394	1.742	0.493	0	0.00	$0.078795	100.6	6.7	$0	0
	Well # 5	63.7	353	1.560	0.481	0	0.00	$0.078795	135.0	8.8	$0	0
*	Well #6	65.7	235	1.041	0.321	0	0.00	$0.078795	230.1	9.1	$0	0
*	Well #7	49.0	326	1.440	0.631	0	0.00	$0.078795	87.4	4.8	$0	0
*	Well #9	73.0	384	1.698	0.367	0	0.00	$0.078795	223.1	14.4	$0	0
	Well # 12	57.6	191	0.844	0.296	0	0.00	$0.078795	199.0	7.0	$0	0
	Well # 13	23.0	386	1.706	0.188	0	0.00	$0.078795	125.0	8.9	$0	0
	Well # 18	44.0	266	1.176	0.298	0	0.00	$0.078795	151.0	7.4	$0	0
	Well # 19	23.3	462	2.838	0.492	0	0.00	$0.078795	85.0	4.1	$0	0
	Well # 20	86.4	235	1.039	0.497	0	0.00	$0.078795	178.0	7.7	$0	0
	Well # 21	76.3	244	1.078	0.226	0	0.00	$0.078795	46.1	15.5	$0	0
*	Well #22	110.1	156	0.691	0.370	0	0.00	$0.078795	334.6	8.7	$0	0
*	Well #23	180.1	594	2.627	0.550	0	0.00	$0.078795	364.3	36.6	$0	0
*	Well #24	122.0	275	1.214	0.600	0	0.00	$0.078795	231.7	10.5	$0	0
											$0	0

Off Peak: $0.03952 / kWh — Ratio of Off-Peak Time During the Week: 0.50

	Existing Wells	TDH (ft)	GPM Q	AF/ 24hrs	% plant eff.	'99 Use (Days)	Total Use AF	Rate $ / kWh	kWh/AF	kW	$$/yr	kWh
	Well A	161.3	150	0.633	0.340	456	288.65	$0.03952	485.0	13.4	$242	6,113
	Well B	108.5	269	1.189	0.387	924	1098.64	$0.03952	287.0	14.2	$519	13,128
*	Well C	168.5	239	1.057	0.454	420	443.94	$0.03952	417.3	16.7	$277	7,018
*	Well #1	44.3	394	1.742	0.493	2,064	3595.49	$0.03952	100.6	6.7	$544	13,767
	Well # 5	63.7	353	1.560	0.481	2,688	4193.28	$0.03952	135.0	8.8	$936	23,672
*	Well #6	65.7	235	1.041	0.321	2,844	2960.60	$0.03952	230.1	9.1	$1,019	25,787
*	Well #7	49.0	326	1.440	0.631	1,500	2160.00	$0.03952	87.4	4.8	$283	7,152
*	Well #9	73.0	384	1.698	0.367	1,752	2974.90	$0.03952	223.1	14.4	$996	25,205
	Well # 12	57.6	191	0.844	0.296	1,344	1134.34	$0.03952	199.0	7.0	$372	9,410
	Well # 13	23.0	386	1.706	0.188	2,028	3459.77	$0.03952	125.0	8.9	$713	18,041
	Well # 18	44.0	266	1.176	0.298	2,616	3076.42	$0.03952	151.0	7.4	$765	19,355
	Well # 19	23.3	462	2.838	0.492	2,628	7458.26	$0.03952	85.0	4.1	$428	10,832
	Well # 20	86.4	235	1.039	0.497	2,436	2531.00	$0.03952	178.0	7.7	$741	18,748
	Well # 21	76.3	244	1.078	0.226	1,416	1526.45	$0.03952	46.1	15.5	$868	21,974
*	Well #22	110.1	156	0.691	0.370	672	464.35	$0.03952	334.6	8.7	$232	5,878
*	Well #23	180.1	594	2.627	0.550	660	1733.82	$0.03952	364.3	36.6	$956	24,178
*	Well #24	122.0	275	1.214	0.600	1,476	1791.86	$0.03952	231.7	10.5	$615	15,549
											$8,702	220,203

*These well numbers have been generated using data from normal operating wells. They have been calculated using the following ratios:
TDH - decreased 22% of normal operation
Q - increased 29% of normal operation
AF / 24 hrs - increased 22% of normal operation
plant eff. - remained the same as normal operation
kWh/AF - increased 33% of normal operation

Well Pumping Cost:	$8,702
Well Pumping kWh:	220,203

Partnerships and Cooperator

First is the California Dept. of Fish and Game, who say that the proposed project will directly benefit waterfowl as a loafing or resting area. This site has Kit Fox dens and Wood Duck nesting boxes already in place and fence enclosures around various mature Valley Oak trees. This parcel is also a nesting site for the Great Blue Heron. They would possibly support it's construction after reviewing the project.

Secondly, The Campbell- Moreland Ditch Co. is a long time partner of V.I.D. on various accounts within the Tule River Assn. V.I.D. is a shareholder in C-M Ditch Co. and also runs the Vandalia Ditch Account water (V.I.D. owned) down C-M ditch to get it to the V.I.D. well fields.

Third, The State of California Developmental Center is our neighbor directly east of the proposed project field. Their water is utilized in the same manner as V.I.D.'s and they are the largest shareholder in the C-M Ditch Co. They directly benefit our groundwater recharge program. They too support the project.

Fourth, The Tulare County Emergency Services (Flood Control) are supportive because of the potential flood protection in the winter due to the excessive runoff in our foothill area. We currently take a substantial amount of flood waters and inject them into our existing percolation ponds. This will just give us an added control dimension to a system that is already in place.

Fifth, The Teapot Dome Water District and the V.I.D. are already partners with a Ground Management Plan, consisting of ground water measurements of 25 local wells biannually. The development of a recharge and wildlife enhancement basin in 1996, approx. 1/2 mile east of the proposed project, has been extremely successful. The proposed reservoir project gives an added control device to manage groundwater and increase amounts injected.

Sixth, The Safari Club International will become a partner with V.I.D. at the proposed project field doing some wildlife enhancement projects, ie; planting various plants, maintain Kit Fox dens, Wood Duck boxes, charting duck production and various other projects.

VANDALIA IRRIGATION DISTRICT

BUDGET SUMMARY

ITEM	AMT	UNITS	QTY	TOTAL COST	UNITS	LIFE YRS	PRESENT VALUE	LOCAL SHARE	CALFED REQUEST
A. Salaries and Wages:									
Project Manager	2083	$/MO	12	25,000	$	1	25,000	25,000	-0-
B. (NONE)									
C. Supplies:									
Booster	40,000	$	1	40,000	1	20	40,000	-0-	40,000
Filter	1,500	$	20	30,000	20	20	30,000	-0-	30,000
VFD Booster	30,000	$	1	30,000	1	20	30,000	-0-	30,000
SCADA	60,000	$	1	60,000	1	20	60,000	-0-	60,000
D. Equipment:									
Contractor Supply	100,000	$	1	100,000	1	25	100,000	-0-	100,000
E. Services or Consultants:									
Engineer	31,200	$	1	31,200	1	1	31,200	31,200	-0-
SCADA Design	7,200	$	1	7,200	1	1	7,200	7,200	-0-
Filtration	3,600	$	1	3,600	1	1	3,600	3,600	-0-
Electrical Consultant	10,000	$	1	10,000	1	1	10,000	10,000	-0-
F. Travel:									
	833	$/MO	12	10,000	$	1	10,000	10,000	-0-
G. (NONE)									
H. TOTAL ESTIMATED COSTS:							347,000	87,000	260,000